MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2018 / 2019 SESSION

DPJ 5018 – PROGRAMMING IN JAVA

(DIT Only)

22 OCTOBER 2018
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **10** pages.
2. There are **FIVE (5)** questions. Each question carries 20 marks.
3. Attempt **ALL** questions.
4. Please write your answers in the **Answer Booklet** provided.

STRUCTURED QUESTIONS (100 MARKS)

Answer ALL questions. Each question carries 20 marks.

QUESTION 1 [20 MARKS]

a) A local courier company charges for parcel delivery based on the following:

Weight of parcel	West Malaysia (RM)	East Malaysia (RM)
1 kg or less	8.50	14.50
Over 1 kg but not more than 1.75 kg	12.50	22.50
Over 1.75 kg but not more than 2 kg	14.00	25.00
2 kg – 3 kg	24.00	46.00
Over 3 kg	Not applicable	Not applicable

Table 1: Parcel delivery charges

Note: For parcel which over 3 kg needs to use different type of rates.

Write code segment to determine the charges of the parcel based on the delivery location. (10 Marks)

b) Write code segment to get the sum of all integers from 1 up to the number entered by user. ***For example:*** if user enters the number of **4**, the loop will find the sum of 1, 2, 3, and 4. The program displays the number of **10**. Assume `input` is used as `Scanner` object.

(10 marks)

[TOTAL 20 MARKS]

Continued...

QUESTION 2 [20 MARKS]

a) Write a `static` method named `getPetrolLiter` that calculates how much fuel (liter) user shall get with the amount of money. The price of 1 liter of petrol RON95 is RM 2.20. This method gets input from user for the amount of money (`double`), and returns the liter (`double`). Assume `input` is used as the `Scanner` object.

(8 Marks)

b) ***Table 2*** shows the rainfall readings of five months for Melaka districts (Melaka Tengah, Alor Gajah and Jasin). (12 Marks)

Month/District	Month 1	Month 2	Month 3	Month 4	Month 5
Melaka Tengah	130	170	155	100	90
Alor Gajah	150	169	149	120	100
Jasin	171	172	150	100	70

Table 2: Rainfall readings

i. Declare and create a two-dimensional array to store the readings. *[2m]*

ii. Write code segment to find the highest rainfall readings. Display the district name, month and highest reading. *[10m]*

[TOTAL 20 MARKS]

Continued...

QUESTION 3 [20 MARKS]

a) Refer to the following class declaration: (10 Marks)

```
public class Circle
{
    private double radius;
    private final double PI = 3.142;

    public Circle(double radius)
    {
        this.radius = radius;
    }

    public double getCircumference()
    {
        return(2*PI*radius);
    }
}
```

i. Write a `toString` method for `Circle` class. The method should return a string containing the radius and the circumference. *[2.5m]*

ii. Write an accessor method for the `radius` field. *[2.5m]*

iii. Write a statement that may appear in a constructor of subclass of `Circle` that calls the constructor and passes ***14.0*** as the argument. *[1.5m]*

iv. Write a class header for `Ball` that inherits `Circle` class. *[1.5m]*

v. If `radius` is declared as `protected`, what classes have the accessibility to access them? *[2m]*

Continued...

b) What is the output of the following program (***ProgramB.java***)? (5 Marks)

```
public class ProgramB
{
    public static void main(String[]args)
    {    Train transport1 = new Train();
         Boat transport2 = new Boat();
    }
}

class Vehicle
{
    public Vehicle()
    {
        System.out.println("A machine that transports
people or cargo"); }
}

class Train extends Vehicle
{
    public Train()
    {
        this("Steam Power");
        System.out.println("Running on rails.");
    }
    public Train(String msg)
    {
        System.out.println("Engine: "+msg);
    }
}

class Watercraft extends Vehicle
{
    public Watercraft()
    {
        System.out.println("Water borned vehicles.");
    }
}
class Boat extends Watercraft
{
    public Boat()
    {
        System.out.println("A watercraft of a large range
of type and size.");
    }
}
```

Program 3.1: ProgramB.java

Continued...

c) Refer to ***Program 3.2 (TestingException.java)*** for the following questions. Write the output of the program if user enters: (5 Marks)

i. ***117*** for `digit` and ***6*** for `number`. *[1m]*

ii. ***Oneonesix*** for `digit`, then ***116*** for `digit` (second time input), ***three*** for `number`, ***116*** again for `digit` (third time input) and ***0*** for `number`. *[4m]*

```
import java.util.*;

public class TestingException
{   public static void main(String [] args)
    {
    boolean loop = true;
    do{
       try {
        System.out.print("Enter the first 3 digits of your
ID: ");
        String digit = new Scanner(System.in).next();

        System.out.println("Batch "+checkYear(digit));

        System.out.print("Enter a number: ");
        int number = new Scanner(System.in).nextInt();

        if(number<=0)
            throw new IllegalArgumentException("Invalid
Number.");

        else {
              loop=false;
              int idNo = Integer.parseInt(digit);
              float answer = (float)idNo/number;
              System.out.print("Answer "+answer);
              }
       }//try

       catch(NoSuchElementException e)
       { System.out.println("Wrong element. Repeat."); }

       catch(NumberFormatException e)
       { System.out.println("Wrong format. Repeat."); }

       catch(RuntimeException e)
       { System.out.println("Oh no! "+e.getMessage()+"
Operation aborted.");
         loop = false; }

      }while(loop);
   }//main
```

Continued...

```
    public static int checkYear(String no)
    {
      int year = 2000 + (Integer.parseInt(no)-100);
      return year;
    }
}//class
```

Program 3.2: TestingException.java

[TOTAL 20 MARKS]

QUESTION 4 [20 MARKS]

In a software house company, a programmer is entitled to get a half year bonus based on his/her completed projects within six months. Refer to the UML class diagrams as shown in ***Figure Q4a*** for the following instructions:

a) Write a class named `Programmer` that extends the `Staff` class. The class consists of the following fields, constructor and methods.
   - The `projectStatus` field is an array to store the status for each projects that are assigned to the programmer.
   - The `halfYearBonus` field represents the amount of the programmer's half year bonus.
   - Constructor `Programmer()` constructs an object of `Programmer` by calling the superclass's constructor with parameters (as shown in the class diagram) and set the data accordingly.
   - Method `setProjectStatus()` is a mutator method to set the project status to the `projectStatus` field.
   - Method `getNoOfCompletedStatus()` counts the number of completed projects and return the number.

Continued...

- Method `getHalfYearBonus()` returns the total half year bonus of the programmer. To calculate the half year bonus:
  - Calculate the percentage of completed projects by calling method `getNoOfCompletedStatus()` and divide by number of project.
  - Then, determine the rate for the bonus based on the percentage (refer to ***Table 3***).

Percentage of completed project	Bonus Rate (%)
100%	50%
More than 50%	30%
Others	0

Table 3: Bonus rate

  - Next, calculate the half year bonus with this formula:

Half year bonus = basic salary + basic salary x bonus rate

(Note: call the superclass's method `getSalary()` to get the value of basic salary of the programmer)

b) Next, write an application program to test the `Programmer` class
- Prompt the user to key-in staff's name, ID, basic salary and number of projects within six months.
- Create a `Programmer` object with the parameters of the staff name, ID and the basic salary.
- Then, create an array of boolean type based on the number of the projects entered by the user earlier.
- Prompt the user to key-in the status for each project. User must type `true` for complete or `false` for incomplete, and store in the array accordingly.
- Then, call method `setProjectStatus` to set the array of status project to the programmer.
- Display all the details by calling the appropriate methods: (Refer to ***Figure Q4b*** for output screen)
  - The programmer's name, ID and basic salary.
  - Total number of completed projects
  - And half-year bonus achieved by the programmer.

(Note: You DO NOT have to write the `Staff` class)

Continued...

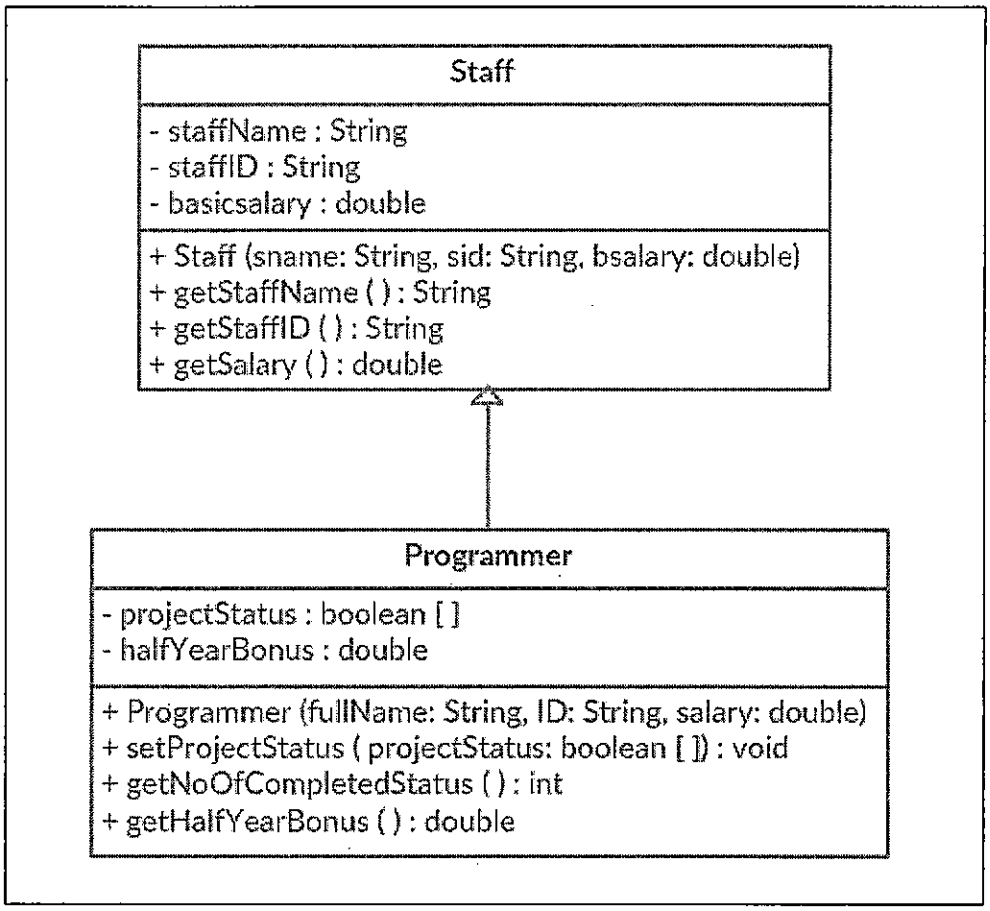
Staff
- staffName : String
- staffID : String
- basicsalary : double
+ Staff (sname: String, sid: String, bsalary: double)
+ getStaffName ( ) : String
+ getStaffID ( ) : String
+ getSalary ( ) : double
Programmer
- projectStatus : boolean [ ]
- halfYearBonus : double
+ Programmer (fullName: String, ID: String, salary: double)
+ setProjectStatus (projectStatus: boolean [ ]) : void
+ getNoOfCompletedStatus ( ) : int
+ getHalfYearBonus ( ) : double

Figure Q4a: UML class diagrams of Staff and Programmer

Continued...

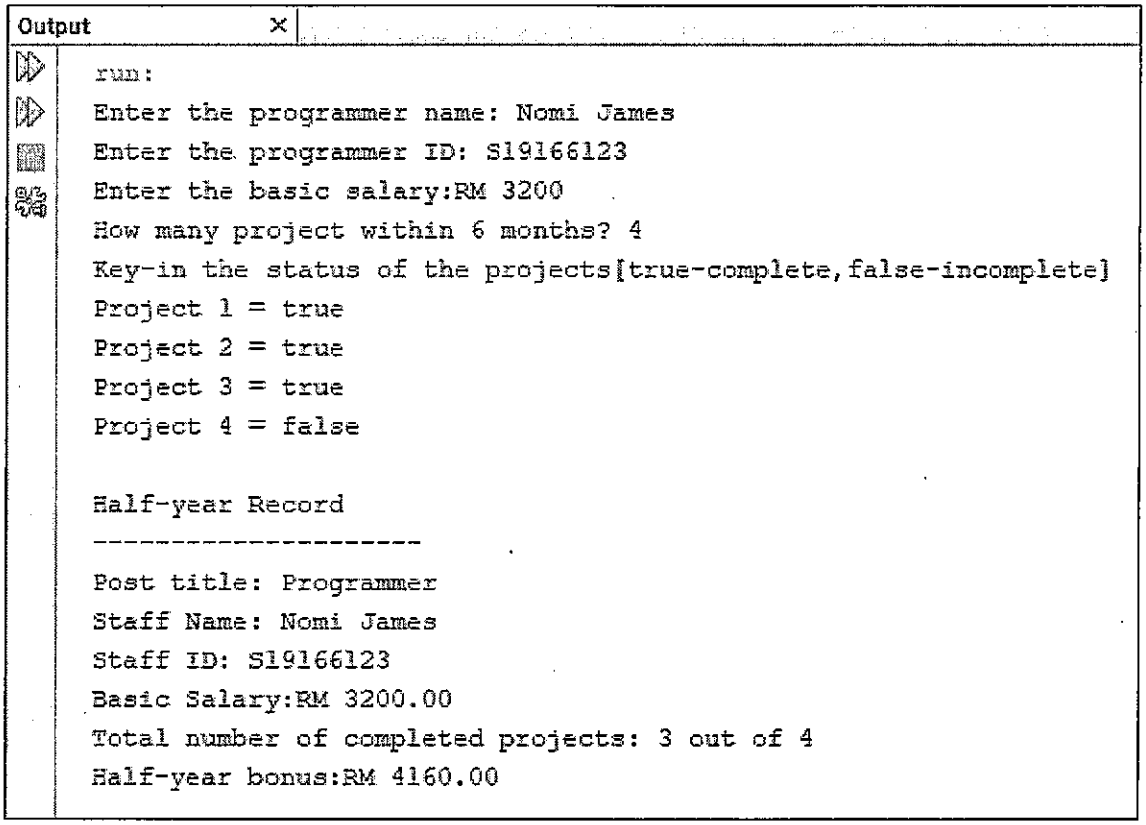

Figure Q4b: Output screen

[TOTAL 20 MARKS]

Continued...

QUESTION 5 [20 MARKS]

Write an **Applet** program that converts kilogram to the selected unit as shown in the following output screens. The user enters a value in kilogram and selects the conversion unit from a drop-down menu (Gram, Milligram, Pound and Ounce). Then, the result is displayed in the text field.

Note:

- 1 kilogram is equivalent to 1000 gram
- 1 kilogram is equivalent to 100,000 milligram
- 1 kilogram is equivalent to 2.205 pounds
- 1 kilogram is equivalent to 35.274 ounces

Refer to the output screens (***Figure Q5a & Figure Q5b***) for the other descriptions.

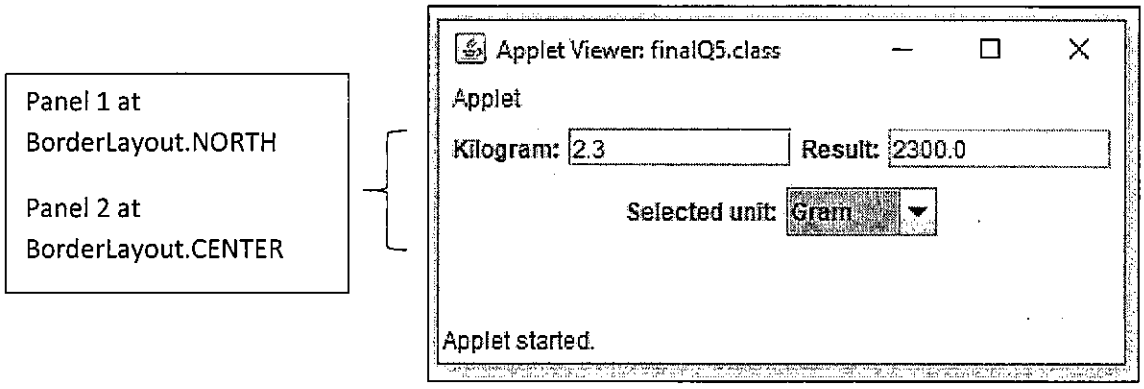

Figure Q5a: Sample output for Kilogram to Gram

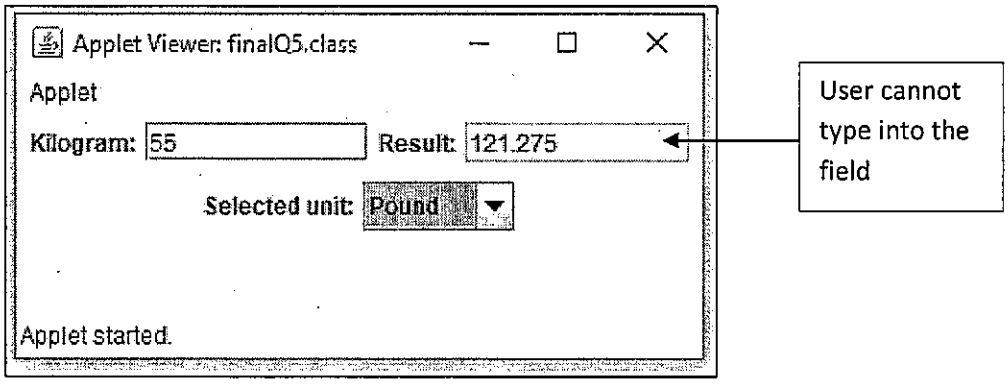

Figure Q5b: Sample output for Kilogram to Pound

[TOTAL 20 MARKS]

End of Page.